




Clean Power Plan — so far

Kansas Corporation Commission
February 8, 2016



SUNFLOWER ELECTRIC POWER CORPORATION

A Touchstone Energy® Cooperative 

... energy done right

Legal Challenges and the Lineup



- Legal challenge will likely take several years — Supreme Court will ultimately decide the case
- States are challenging GHG rulemaking
 - 47 states generating systems have “affected” EGUs
 - 27 states have appealed the plan
 - 18 states support the plan
- Five major appeals filed, and a stay of the rule has been sought before the DC Circuit, denied by that Court, and appealed to SCOTUS
- Several G&Ts, including Sunflower, have joined with NRECA as plaintiffs challenging the legality of the rule

Implications of EPA's Timeline Changes



- Deadline for filing a final state compliance plan is moved back two years (~~2016~~**2018**)
- States have three years to submit final plan:
 - September 2016 – submit initial plan (lighter lift)
 - September 2017 – submit interim status report
 - September 2018 – submit final plan (heavy lift)
- Interim compliance date is moved back two years (~~2020~~**2022**)
- **Critical decisions such as rate- or mass-based compliance methodology, or single- or multi-state decisions are not required in the initial plan**

Compliance Plan impact on Sunflower and Mid-Kansas Assets



If allowed to trade allowances among our own affected EGUs, the federal plan would reduce CO2 emissions across the system fleet by 10% in 2022 and by 20% in 2030 and beyond

| Plant Name | 2014 Actual CO2 Emissions | 2022-2024 First Period Allocation (short tons) | 2025-2027 Second Period Allocation (short tons) | 2028-2029 Third Period Allocation (short tons) | Final Allocation (short tons) |
|------------------------------|---------------------------|--|---|--|-------------------------------|
| Holcomb,H1 | 2,233,478 | 1,728,276 | 1,706,687 | 1,604,718 | 1,544,336 |
| Cimarron River, CR1 | 1,638 | 75,797 | 74,850 | 70,378 | 67,730 |
| Fort Dodge, FD4 | 187,198 | 268,287 | 264,936 | 249,107 | 239,733 |
| Great Bend, GB3 | 5,112 | 73,866 | 72,943 | 68,585 | 66,005 |
| Garden City, S2 | 8,707 | 55,057 | 54,369 | 51,121 | 49,197 |
| TOTAL CO2 Emissions | 2,436,133 | 2,201,283 | 2,173,785 | 2,043,909 | 1,967,001 |
| % Reduction from 2014 | | 9.6% | 10.8% | 16.1% | 19.3% |



Thoughts about Developing Compliance Plan

- State vs federal compliance plan – **work for a state compliance plan**
- Mass-based vs. rate-based plan – will likely differ widely among states and perhaps with time
- State-only vs multi-state or regional plan
 - Costs higher with state-only plan
 - ... anyway, the grid is regional
- **Allowance trading (mass-based) or ERC (rate-based) trading is extremely important**
- Reliability impact – SPP must be deeply involved
- Reliability safety valve and trading are essential

CPP Impact on Sunflower Resources



- Affected system Electric Generating Units (EGUs)
 - HL1, S2, FD4, GB3, CR1
- System EGUs not affected by CPP
 - S4, S5, CL1, S3, CR2, CL2, RTS
- Specified 2030 national target emission rate
 - 1305 lb/MWh for Coal-based EGUs
 - 771 lb/MWh for Natural Gas Combined-Cycle (NGCC) EGUs
 - 1293 lb/MWh EPA composite effective emission rate for Kansas
- Expected CO₂ emission rates @ current utilization
 - HLS 1 — 2150 lb/MWh design (operates at 2300 lb/MWh)
 - Gas-steam — 1250 lb/MWh design (operates at 1500 lb/MWh)

CPP Will Drive Future System Decisions



- Jeffrey Energy Center participation expires in 2019 (170 MW)
- Extend Rubart Station's construction permit — 12 more reciprocating-engine units (112 MW)
- **Holcomb** critical decisions for analysis
 - Major maintenance decisions – delay 2016 outage until 2018
 - Changing utilization (duty-cycle) in SPP Integrated Market
 - **Potential conversion to natural gas/biomass**
- Decisions about retirement dates
 - Gas-steam retirement impacted by CPP
 - Do we show a conversion or retirement date for HLS1
- Consider participation in jointly-owned NGCC unit with other Kansas utilities
- Proceed with cautious optimism for compliance – avoid premature decisions

Wave-top Issues Embodied in the CPP



- CPP depends heavily on reducing fossil use and on dramatically increasing the penetration of new renewable resources
- Wind-based resources already saturate the existing western and central Kansas transmission grid
- More renewables will require more transmission
 - As much as 70% of the total, land-based, wind potential in the U.S. is within the SPP footprint
 - Additional wind resources will be constructed in the SPP footprint
 - Solar resources will be constructed in the SPP footprint
 - Does this renewables penetration allow for an adequate fuel diversity mix for the Sunflower system



Renewable Issues Worth Considering

What Renewables Are Needed



- Estimate indicates 71,000 MWs of nameplate renewables in the entire eastern interconnection since 2000, but 61,000 MWs of it before 2013
- Under the CPP the eastern interconnection will need, **in addition to what is already deployed**, between 100,000 MW (high CF wind) or 170,000 MW (solar) of new utility-scale renewable resources or some combination of both

CPP impacts within the SPP Footprint



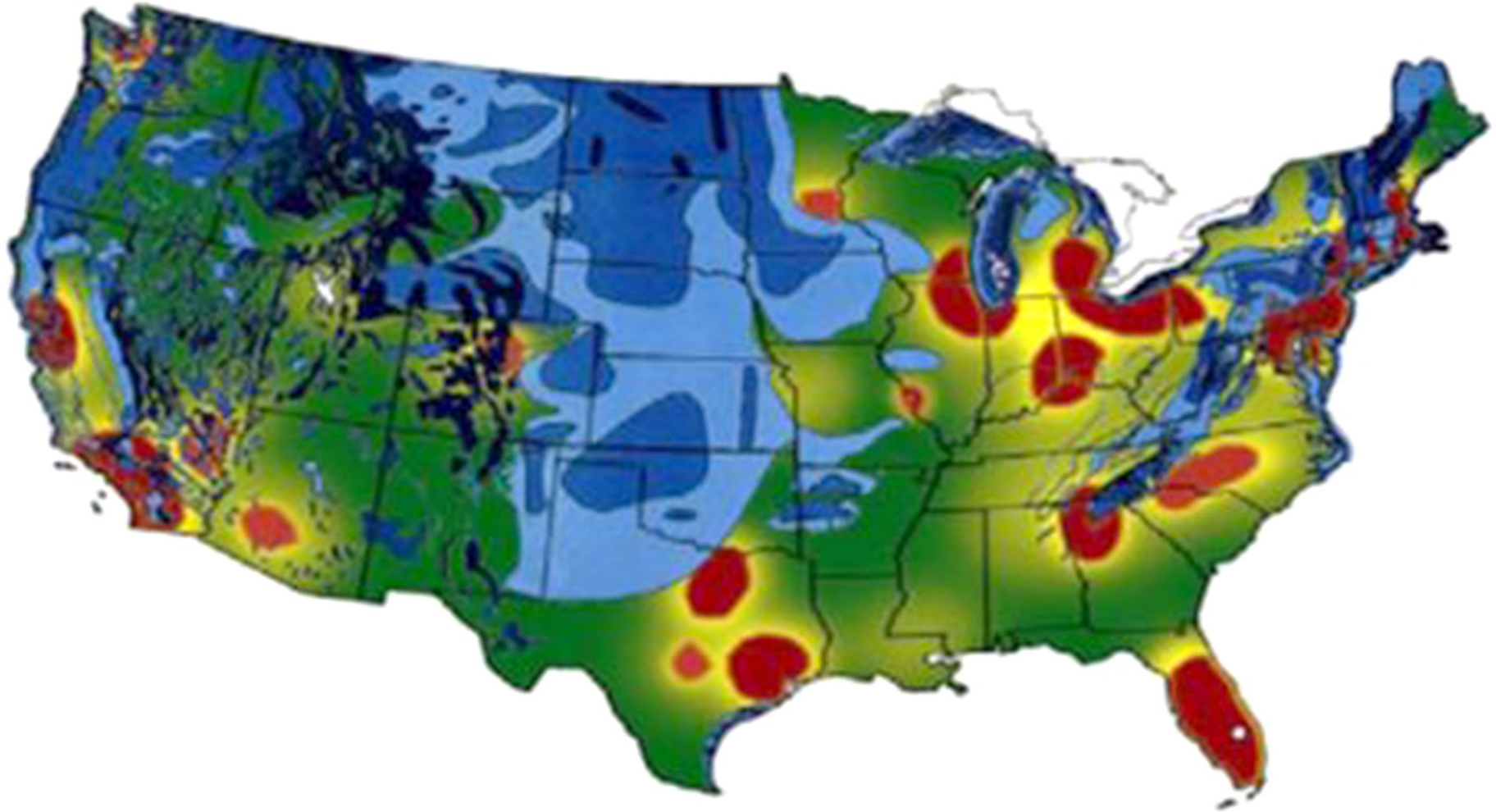
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 - Additional wind resources will be constructed in the SPP footprint
 - Probably a large amount
 - Probably significant amounts within Sunflower zone
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 - Probably significant amounts within the Sunflower zone

CPP Renewables Required - Eastern Interconnect (Million MWh/yr or TWh/yr)



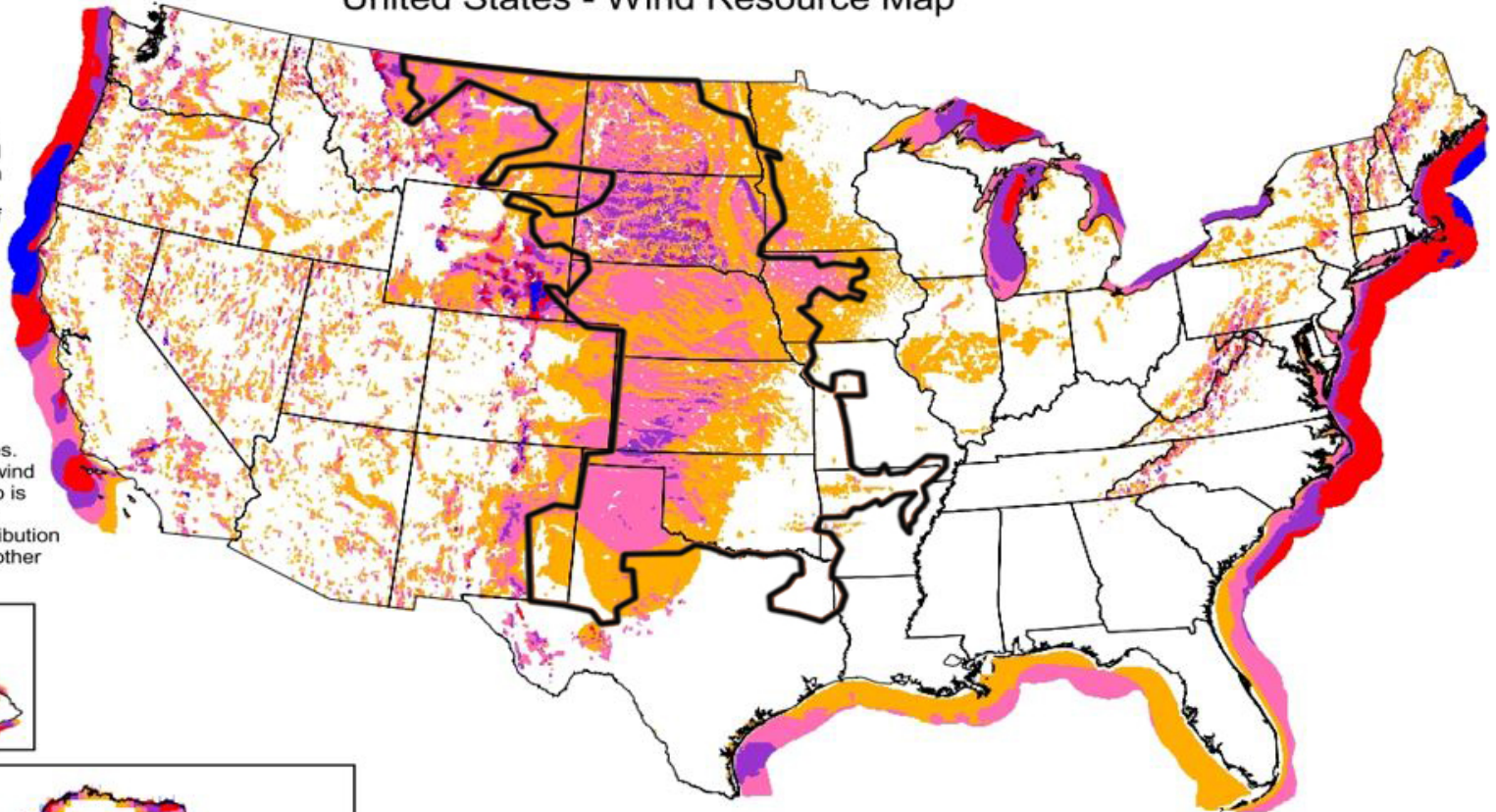
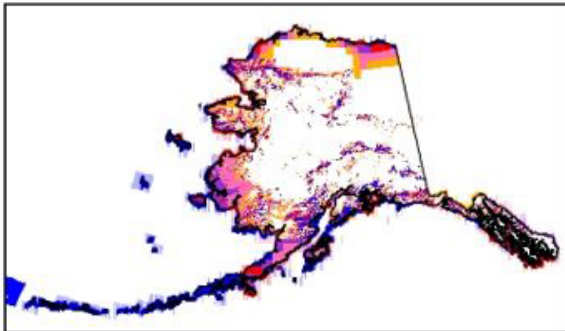
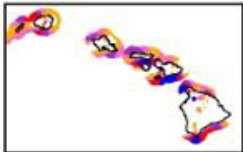
| Year | TWh/yr | % of 2030 | % increase/year |
|--------------------|--------|-----------|-----------------|
| 2022 | 166.2 | 37.9% | |
| 2023 | 181.5 | 41.4% | 3.5% |
| 2024 | 218.2 | 49.8% | 8.4% |
| 2025 | 254.9 | 58.1% | 8.4% |
| 2026 | 291.6 | 66.5% | 8.4% |
| 2027 | 328.3 | 74.9% | 8.4% |
| 2028 | 365.0 | 83.3% | 8.4% |
| 2029 | 401.7 | 91.6% | 8.4% |
| 2030 | 438.4 | 100.0% | 8.4% |
| | | | |
| Grain Belt Express | 15.3 | 3.5% | |
| Plains & Eastern | 15.3 | 3.5% | |
| Rock Island | 10.7 | 2.4% | |

US Electric Energy Load Centers



United States - Wind Resource Map

This map shows the annual average wind power estimates at a height of 50 meters. It is a combination of high resolution and low resolution datasets produced by NREL and other organizations. The data was screened to eliminate areas unlikely to be developed onshore due to land use or environmental issues. In many states, the wind resource on this map is visually enhanced to better show the distribution on ridge crests and other features.



Wind Power Classification

| Wind Power Class | Resource Potential | Wind Power Density at 50 m W/m^2 | Wind Speed ^a at 50 m m/s | Wind Speed ^a at 50 m mph |
|------------------|--------------------|------------------------------------|-------------------------------------|-------------------------------------|
| 3 | Fair | 300 - 400 | 6.4 - 7.0 | 14.3 - 15.7 |
| 4 | Good | 400 - 500 | 7.0 - 7.5 | 15.7 - 16.8 |
| 5 | Excellent | 500 - 600 | 7.5 - 8.0 | 16.8 - 17.9 |
| 6 | Outstanding | 600 - 800 | 8.0 - 8.8 | 17.9 - 19.7 |
| 7 | Superb | 800 - 1600 | 8.8 - 11.1 | 19.7 - 24.8 |

^a Wind speeds are based on a Weibull k value of 2.0

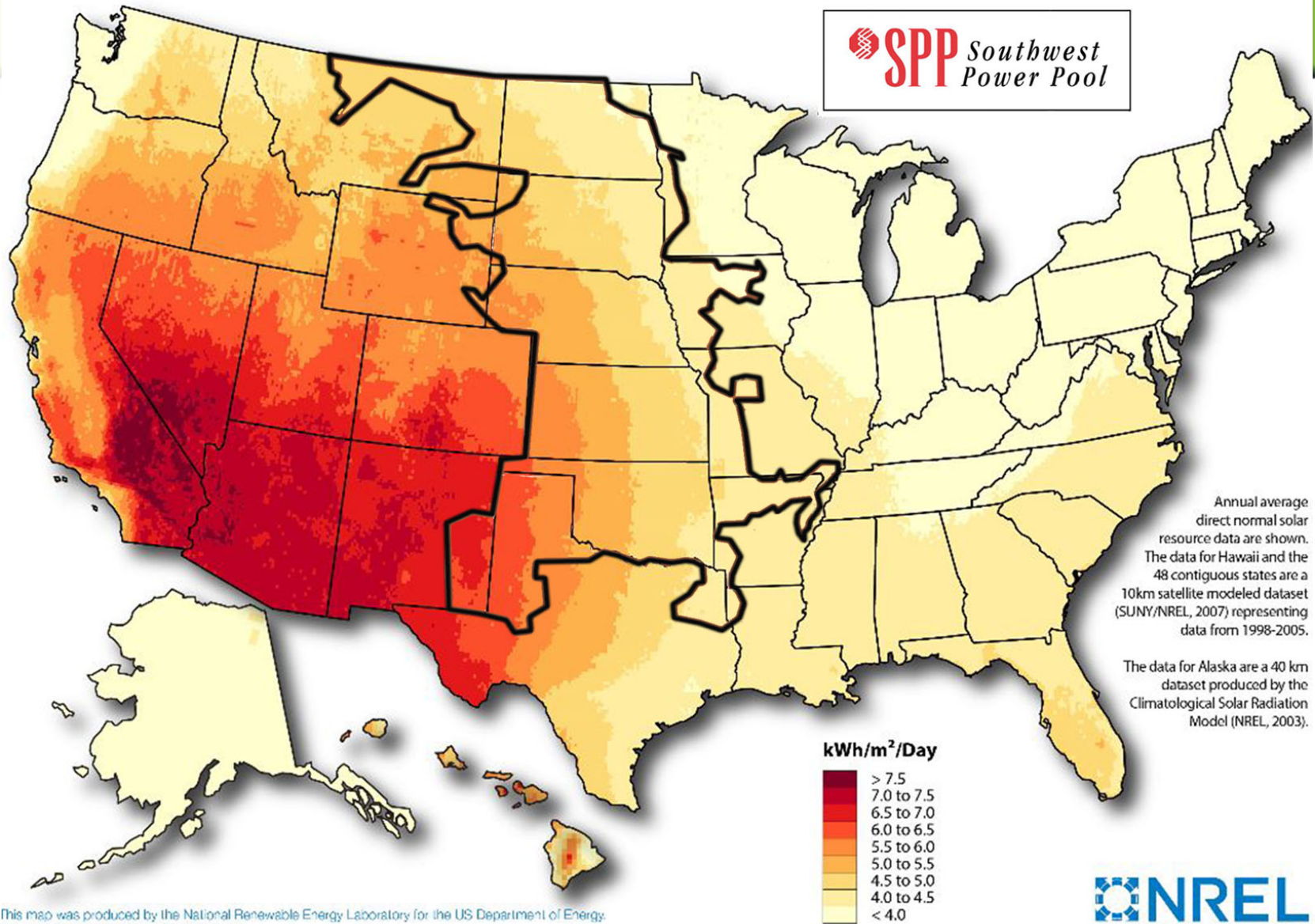


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Concentrating Solar Resource of the United States

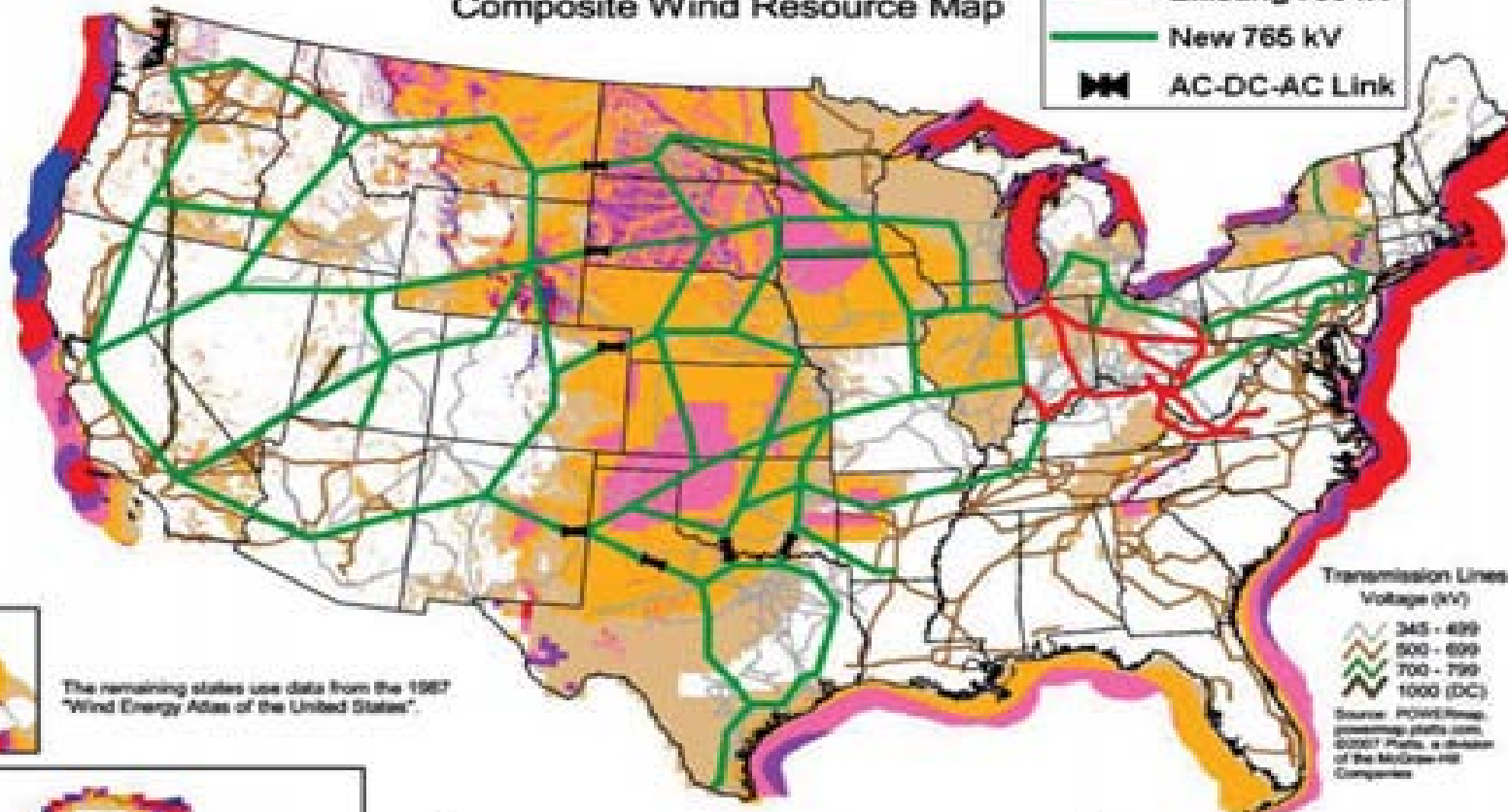
 **SPP** Southwest
Power Pool



NREL Updated Maps:
 Arizona (2002)
 California (2002)
 Colorado (2004)
 Connecticut (2001)
 Delaware (2002)
 Hawaii (2004)
 Idaho (2002)
 Illinois (2001)
 Indiana (2004)
 Maine (2001)
 Maryland (2002)
 Massachusetts (2001)
 Michigan (2004)
 Missouri (2005)
 Montana (2002)
 Nebraska (2005)
 Nevada (2003)
 New Jersey (2002)
 New Hampshire (2001)
 New Mexico (2002)
 North Carolina (2002)
 North Dakota (2000)
 Ohio (2004)
 Oregon (2002)
 Pennsylvania (2002)
 Rhode Island (2001)
 South Dakota (2001)
 Texas (2000)
 Utah (2003)
 Vermont (2001)
 Virginia (2002)
 Washington (2002)
 West Virginia (2002)
 Wyoming (2002)

Composite Wind Resource Map

- Existing 765 kV
- New 765 kV
- AC-DC-AC Link



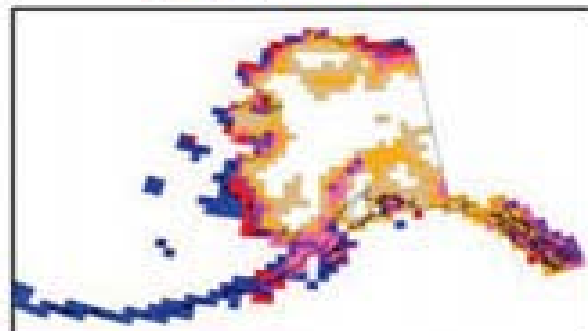
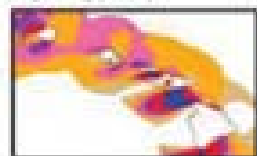
Transmission Lines

Voltage (kV)

- 345 - 600
- 500 - 600
- 700 - 750
- 1000 (DC)

Source: POWERMAP, powermap.platts.com, ©2007 Platts, a division of the McGraw-Hill Companies

The remaining states use data from the 1987 "Wind Energy Atlas of the United States".



Wind Power Classification

| Wind Power Class | Resource Potential | Wind Power Density at 50 m W/m ² | Wind Speed ^a at 50 m m/s | Wind Speed ^a at 50 m mph |
|------------------|--------------------|---|-------------------------------------|-------------------------------------|
| 2 | Marginal | 200 - 300 | 5.8 - 6.4 | 12.5 - 14.3 |
| 3 | Fair | 300 - 400 | 6.4 - 7.0 | 14.3 - 15.7 |
| 4 | Good | 400 - 500 | 7.0 - 7.5 | 15.7 - 16.8 |
| 5 | Excellent | 500 - 600 | 7.5 - 8.0 | 16.8 - 17.9 |
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